

## January 2010 Senior Executive Service Biography - Dr. Jay Paul Boris

### *Present Assignment:*

NRL Chief Scientist and Director NRL Code 6400

Laboratory for Computational Physics and Fluid Dynamics (LCP&FD)

Naval Research Laboratory Chair of Science in Computational Physics (1978 - Present)

### *Address:*

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### *Summary of Duties:*

Dr. Jay Paul Boris is the NRL Chief Scientist and Director of the Laboratory for Computational Physics and Fluid Dynamics. He is a member of the National Academy of Engineering and an internationally recognized technical authority and research leader in the fields of computational physics, fluid dynamics, reactive flow including turbulence and propulsion, the urban transport and dispersion of atmospheric contaminants relevant civil defense, and plasma dynamics and magnetohydrodynamics for laboratory and space applications. He received his Bachelor of Arts degree in Physics (1964) and Masters and PHD degrees in Astrophysical Sciences (1968) from Princeton University. After a year employment with Princeton University stationed at the Culham laboratory in England, Dr. Boris joined the permanent staff of NRL in 1971 as a Senior Consultant in the Plasma Physics Division working on the physics of High Altitude Nuclear Explosions (HANE). He became an NRL Chief Scientist and Director of Code 6400, now a division level laboratory, in 1978.

Dr. Boris plans and leads the execution of research on advanced analytical and numerical capabilities and the engineering application of these new capabilities to solve problems vital to the DON, the DoD, and the nation. To accomplish this, his expertise necessarily extends to the development and practical application of advanced computing architectures for parallel processing, to applied mathematics relevant to creating unique new solution methods, to extreme data compression, and to advanced applications of computer graphics. His expertise and that of his division is recognized around the world, as evidenced by society fellowships, numerous national and international awards, and invited lectures and prize lectureships. This also results in requests for help and technical collaboration from U.S. and foreign universities, industries, government laboratories, government agencies and other NRL and Navy organizations. Dr. Boris can also have significant impact on the mission of the DON, on significant programs because of its important role in developing and evaluating proposed new technologies, and even on DON policies. The high-fidelity simulation and design capabilities developed under the incumbent's leadership act as technology accelerators with important impact on Naval Power 21 implementation and thus are vital to avoiding technological surprise.

His invention of Flux-Corrected Transport in 1971 and his subsequent use of the FCT technology in proving the MILES approach for turbulence modeling has resulted in two books penned by international communities extolling these technologies. These ground breaking fluid dynamic simulation technologies also made possible his transformational innovations in airborne urban contaminant transport prediction for combating weapons of mass destruction including the patented CT-Analyst system. This capability is 1000 times faster and more accurate than DoE, DHS, and DTRA capabilities previously fielded and so was specifically identified by the Multi-

Agency Coordinating Committee and the National Medical Response Team to provide HaZMAT security for the 2009 Presidential Inauguration.

The specifics of Dr. Boris's position are:

- Conceives, plans, and executes programs leading to new computational technologies to simulate, design, and evaluate new concepts in weapons, propulsion, platform survivability and stealth, personnel protection, and novel autonomous vehicles.
- Creates unique new analysis capabilities, algorithms, and computer programs to solve roadblock problems that are brought to his attention by NRL, DoN, DoD and other U.S. government agency management.
- Serves as a scientific consultant and technical expert to the DoN, DoD, the National Academy of Engineering, and other government and international agencies on the use of large-scale computing to solve research, engineering, and operational issues and on solving specific difficult problems in fluid deformable vehicle aerodynamics, detonation dynamics, advanced propulsion concepts, helmet and body-armor design for personnel protection, fire and explosion safety, and emergency-assessment technology for civil and base defense to counter airborne weapons of mass destruction (WMD).
- Meets with senior Naval Officers and Senior members of sponsoring agencies to develop, present, and defend proposed program initiatives. Obtains funds to support agreed upon program execution within the Navy Working Capital Fund.
- Creates and implements plans that anticipate new research directions and future program and facilities needs and recruits and hires personnel to help meet these needs.

**Civilian Service:** Charter Member of the U.S. Senior Executive Service July 1979 - present

**Employment History:** 39 years of Federal service

Head, Plasma Dynamics Branch, NRL Plasma Physics Division, 1976 - 1978

Division Consultant, Computational Physics, Plasma Physics, 1970 - 1976  
Research Physicist, Princeton Plasma Physics Laboratory, 1968 - 1970

**Education:**

Princeton University	Ph.D.	Astrophysical Sciences 1968
Princeton University	M.A.	Astrophysical Sciences 1966
Princeton University	B.A.	Physics, 1964 Magna Cum Laude

**Honors and Awards:**

National Academy of Engineering, Aerospace Section – 2008 Election

American Institute for Aeronautics and Astronautics - 2005 Fluid Dynamics Prize

Exceptional Service Award, DoD High Performance Computing Modernization Office, 2001

Fellow, American Institute for Aeronautics and Astronautics, 1993

U.S. Navy Captain Robert Dexter Conrad Award for Scientific Achievement, 1990

Presidential Rank of Meritorious Executive in the Senior Executive Service, 1988

U.S. Navy Award for Distinguished Achievement in Science, 1980

Washington Academy of Sciences Award in Mathematics and Computer Sciences, 1979

Naval Research Laboratory Chair of Science in Computational Physics, 1978

Arthur S. Fleming Award - One of the Top 10 Civil Servants in Science, 1976  
Fellow, American Physical Society, Plasma Physics, 1976  
U.S. Navy Superior Civilian Service Award, 1975  
Multiple NRL Publication Awards and Outstanding SES performance Awards  
Princeton University Graduate Fellowship, 1964 - 1968  
National Science Foundation Fellowship in Astrophysics, 1965 - 1967  
Princeton University Kusaka Memorial Physics Prize, 1964  
First Princeton University Scholar, 1961 - 1964  
Phi Beta Kappa, Princeton University, 1963

***Other Achievements:***

Dr. Boris has published approximately 400 papers and journal articles including three books and over a dozen book chapters and invited review articles. He co-authored ***Numerical Simulation of Reactive Flow***, the first book on the applications of numerical methods to reactive flows, published by Elsevier, 1987; second edition published by Cambridge University Press, 2001. (Russian translation, 1991, published by Mir in the former Soviet Union.)

Dr. Boris has given over 100 invited or keynote presentations at professional society and international meetings on Computational Physics, Computational Fluid Dynamics, Reactive Flow, Detonations, and Urban Civil Defense Against Airborne Contaminants.

For seven years he served as the DoD Computational Technology Area Leader for Computational Fluid Dynamics (CFD), participating in the initiation and execution of the scalable software development program. Dr. Boris has served on external review panels for the National Academy of Sciences and FOI, the R&D agency of the Swedish Department of Defense, and a number of U.S. Agencies and Laboratories including the Department of Energy and NASA. He is currently serving as a member of the National HPCC Council Advisory Board.

**Professional Memberships and Associations:**

National Academy of Engineering, Aerospace Section  
American Institute of Aeronautics and Astronautics  
    AIAA Fluid Dynamics Technical Committee, 1990 - 1993  
    New Technologies Subcommittee and Internet Working Group, AIAA, 1999 - 2001  
The International Combustion Institute  
    Program Subcommittee, 22nd International Symposium on Combustion, 1986 - 1987  
    Program Subcommittee, 25th International Symposium on Combustion, 1993 - 1994  
American Physical Society, Fluid Dynamics, Plasma Physics and Computational Physics Divisions  
    Executive Committee, APS Plasma Physics Division, 1981 - 1983  
    Executive Committee, APS Computational Physics, 1987 - 1992 (Chair 1990 - 1991)  
    Chair, APS Computational Physics Division Rahman Prize Committee, 1992 - 1994  
DoD High-Performance Computing Modernization Program  
    Fluid Dynamics Computational Technology Area Leader for 1993 - 2000  
Washington Academy of Sciences